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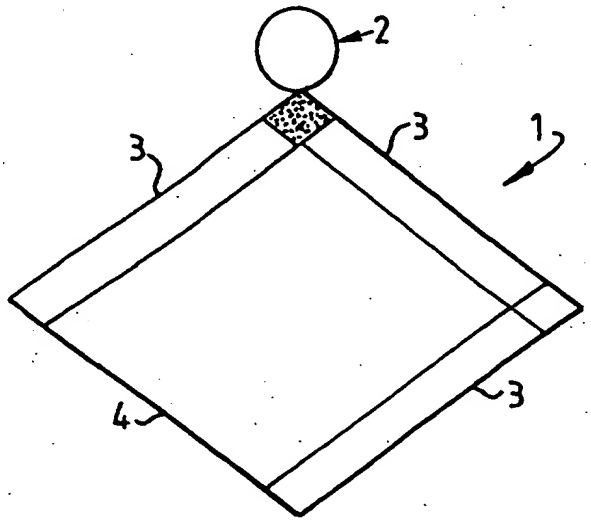
(57) Abstract

An absorbent structure in absorbent articles such as diapers, incontinence protectors, sanitary napkins, panty liners and like articles, wherein the absorbent structure comprises at least 40 percent by weight superabsorbent material, based on the total weight of the absorbent structure in a dry state in the region or regions in which the superabsorbent material is distributed, wherein the superabsorbent material is only partially neutralised. Absorbent articles that include the absorbent structure.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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B. FIELDS SEARCHED

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IPC7: A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 0202126 A2 (THE PROCTER & GAMBLE COMPANY), 20 November 1986 (20.11.86) --	1-7
A	EP 0391108 A2 (CASSELLA AKTIENGESELLSCHAFT), 10 October 1990 (10.10.90) -- --------	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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AN ABSORBENT STRUCTURE IN AN ABSORBENT ARTICLE, COMPRISING A PARTIALLY NEUTRALISED SUPERABSORBENT MATERIAL, AND AN ABSORBENT ARTICLE THAT COMPRISES THE ABSORBENT STRUCTURE

The present invention relates to an absorbent structure in an absorbent article, such as a diaper, a pant diaper, an incontinence protector, a sanitary napkin, a panty liner or some like article, that comprises a partially neutralised superabsorbent material, and also relates to an absorbent article that comprises said absorbent structure.

BACKGROUND

An absorbent article normally comprises an upper liquid-permeable sheet, an absorbent sheet, and a bottom liquid-impermeable barrier sheet, said sheets being delimited by two transverse edges and two longitudinal edges. The article includes a front part and a rear part between which there extends a crotch part that has a wetting region within which the major part of the body fluid is delivered. The absorbent sheet, or layer, will often include a superabsorbent material.

The superabsorbent material is present in particle form, e.g. in a grain, granule, flake or fibre form, and is mixed or layered with other absorbent material, normally cellulose fibres. Superabsorbent materials are polymers that are able to absorb such liquid as water and body fluids, e.g. urine and blood, while swelling and forming a gel that will not dissolve in water. Some superabsorbent materials are able to retain absorbed liquid even when subjected to external pressures. These materials have been used widely in absorbent sanitary products, such as diapers, sanitary napkins, incontinence protectors and like products.

The effectiveness of a superabsorbent material is contingent on many factors, such as how it is mixed into the absorbent structure, its particle form and particle size, and also its physical and chemical properties such as absorption rate, gel strength and liquid retention properties. The absorption capacity of a superabsorbent can be influenced negatively by a phenomenon known as gel blocking. Gel blocking is when the superabsorbent material forms a gel that blocks the pores in the fibre structure or the particle interstices when the absorbent article is wetted. Such blocking impedes the transportation of liquid from the wetted area out to the remainder of the absorbent body and will prevent the total absorption capacity of the absorbent body from being fully utilised and also creates a leakage risk.

With the intention of abating the problem caused by gel blocking, it is known, e.g., to use superabsorbent particles that are embraced by a casing which is only slowly dissolved in and/or penetrated by the liquid to be absorbed, such as to impart to the superabsorbent material a delayed activation time. Prior publication WO 95/00183 teaches an absorbent article that has an absorbent structure which includes superabsorbent material having a delayed activation time in the wetting region of the structure, and conventional superabsorbent material in those regions that lie outside this wetting region.

The problem of gel blocking can also be reduced by using a superabsorbent material that has a high gel strength. High gel strength superabsorbent materials are able to retain absorbed liquid when the swollen material is subjected to external loads, and is also able to absorb a significant quantity of liquid when subjected to external loads. EP 0 339 461 describes a high gel strength superabsorbent for use in absorbent articles. This superabsorbent is able to retain its form to a large extent and will not collapse when swelling.

EP 0 532 002 teaches a superabsorbent material of high gel strength that also has a certain liquid dispersion capacity.

Thus, as described above, one problem with absorbent articles that include superabsorbent material is gel blocking. This increases the risk of leakage and prevents the total capacity of the absorbent structure from being fully utilised. Another drawback with conventional superabsorbents is found in the large extent to which they swell. High concentrations of superabsorbent can swell into a large clump at the wetting point, so as to cause discomfort to the wearer after wetting the article.

The object of the present invention is to provide a solution to these problems.

SUMMARY OF THE INVENTION

The invention relates to an absorbent structure that comprises solely partially neutralised superabsorbent material that does not swell to the same extent as conventional superabsorbent material and therewith allows higher superabsorbent concentrations to be used. When compared with conventional superabsorbent materials, the partially neutralised superabsorbent material absorbs liquid more slowly and therewith enables the liquid to disperse to a greater extent before it swells. Conventional superabsorbent material has a degree of neutralisation of about 70%.

The present invention relates to an absorbent structure in absorbent articles, such as diapers, pant diapers, incontinence protectors, sanitary napkins, panty liners and like articles, wherein the structure comprises at least 40 percent by weight superabsorbent material, based on the total weight of said structure in a dry state in the region or

regions in which the superabsorbent material is distributed, said superabsorbent material having a degree of neutralisation of between 20 and 50%.

The invention also relates to an absorbent article that includes the absorbent structure.

One advantage afforded by the present invention is that an absorbent article can be given a thinness which allows the inventive article to be worn comfortably and discretely. Another advantage afforded by the partially neutralised superabsorbent is that it prevents the occurrence of malodours and skin irritation when the absorbent article is worn.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a bag used in tests in Example 1.

Fig. 2 illustrates results from Example 1 in the form of a curve where absorption is plotted against time.

DESCRIPTION OF THE INVENTION

The invention relates to an absorbent structure that comprises partially neutralised superabsorbent material. The aforesaid problems are therewith solved, by virtue of the fact that a partially neutralised superabsorbent material will not swell to the same extent as a conventional superabsorbent material, i.e. a superabsorbent material that has a degree of neutralisation of about 70%, and will absorb liquid more slowly than said conventional superabsorbent.

A cross-linked polyacrylate of the kind described in European Patent Specification EP 0 391 108, Casella AG, is an example

of one suitable partially neutralised superabsorbent material that can be used in accordance with the invention.

A superabsorbent of this kind does not swell to the same extent as a superabsorbent material that has a higher degree of neutralisation, meaning that the superabsorbent will take up less volume in a swollen state. Consequently, there is less risk that the superabsorbent material when swollen will prevent the transportation of liquid through the pore structure that surrounds the superabsorbent material/the superabsorbent particles. A partially neutralised superabsorbent material according to the invention will, moreover, absorb liquid more slowly than a superabsorbent material that has a higher degree of neutralisation. This slower absorption rate of the partially neutralised superabsorbent enables a larger volume of liquid to disperse from the wetting point to other parts of the absorbent structure and therewith enables the total absorption capacity of the article to be utilised to a greater extent. The examples given below show that the partially neutralised superabsorbent material according to the invention absorbs liquid more slowly and in smaller volumes than conventional superabsorbent materials.

The superabsorbent is comprised of cross-linked polymerised acrylic acid. An ion complex of COO^- and Na^+ or K^+ is formed in the neutralisation process. As liquid is absorbed, an ion exchange takes place between Na^+ and other ions. The partially neutralised superabsorbent contains fewer ions (COO^-) than the conventional superabsorbent. The ions (COO^-) are available for liquid absorption and the fact that fewer ions (COO^-) are available means that the partially neutralised superabsorbent has a somewhat lower absorption capacity. A large number of carboxylic acid groups will be present, although these groups do not contribute towards

absorption but impart to the superabsorbent a pH which is lower than that of a conventional superabsorbent.

Because the superabsorbent used in accordance with the invention absorbs smaller volumes of liquid, the article can be given a higher concentration of superabsorbent without becoming uncomfortable to wear after being wetted. According to the invention, with respect to the partially neutralised superabsorbent material, can now more than 40 percent by weight of superabsorbent material, calculated on the total dry weight of the absorbent structure, in that region or in those regions in which the superabsorbent material is distributed, be used without the aforedescribed problems occurring to the same high extent.

The aforesaid problems are thus solved by virtue of the superabsorbent being partially neutralised. The degree of neutralisation is 20 to 50% in comparison with a degree of neutralisation of about 70% in the case of a typical superabsorbent material.

As previously mentioned, the partially neutralised superabsorbent used in the absorbent structure in accordance with the invention has a lower absorption capacity and a slower liquid absorption rate than conventional superabsorbents. Because liquid is absorbed by the inventive superabsorbent more slowly, the liquid will have more time to disperse in the absorbent layer. The superabsorbent particles will therefore not impede the transportation of liquid to other parts of the absorbent structure to the same high extent. The lower absorption capacity of the superabsorbent also means that this dispersion function will remain active even over a long period of time. Neither will the

superabsorbent particles swell to the same extent as conventional particles, therewith reducing the risk of lumps of superabsorbent being formed. A higher concentration of superabsorbent is permitted and more superabsorbent particles, which are small in size when swollen, can be accommodated in the same volume as fewer conventional superabsorbent particles, which are larger when swollen. This also contributes to a reduction in lump formations. A high concentration of partially neutralised superabsorbent material can thus be used in the absorbent structure, therewith resulting in an absorbent structure that has a high total absorption capacity and a high liquid dispersion capacity with retained comfort of the article after wetting.

There now follows a number of examples which show that the partially neutralised superabsorbent material according to the invention absorbs liquid at a slower rate and in smaller quantities than conventional superabsorbent material.

DESCRIPTION OF EXAMPLE 1

The following example is intended to illustrate that the partially neutralised superabsorbents used in the structure according to the invention absorb less liquid and at a slower rate than conventional superabsorbents. The tests were carried out by dip absorption intended for determining the absorption capacity of superabsorbents.

The apparatus used

- Polyester net, mesh size 59 µm
- Welding equipment
- Test liquid; see below
- Scales, accurate to 0.000 1g

Test liquid

Synthetic urine according to the following recipe:

	Concentration
Magnesium sulphate ($MgSO_4$)	0.66 g/l
Potassium chloride (KCl)	4.47 g/l
Sodium chloride (NaCl)	7.60 g
Urea (Carbamide) (NH_2CONH_2)	18.00 g/l
Potassium dihydrogen phosphate (KH_2PO_4)	3.54 g/l
Sodium hydrogen phosphate (Na_2HPO_4)	0.745 g/l
Triton X-100 0.1%	1.00 g/l
Water de-ionised to 10% nykockin (colour)	0.4 g/l

Method

- The polyester net was clipped into pieces measuring 7 x 12 cm and the pieces then welded together along their edges to form bags.

- The bags were marked.

- The bags (P) were weighed to an accuracy of 0.0001 g.

- 0.19-0.21 g of superabsorbent (S) was weighed into the bags at an accuracy of 0.0001 g.

The superabsorbents were stirred.

- The bags were welded together and their weight checked.

- The superabsorbents were distributed uniformly in respective bags and the bags then placed carefully in the test liquid to soak.

- The bags were placed in the test liquid one at a time, so that the absorption time for each bag was precisely 15 seconds. The same degree of accuracy applies to the total absorption time up to 5 min., but not for 30 and 60 min.

- The bags were removed after 15 s. and hung up to drip for 2 min. The bags were hung from one corner so that the weld-free bottom of the bag faced downwards.

See Fig. 1, which shows the bag 1 hanging from a ring 2 and comprising three welded edges 3 and a non-welded edge 4 which faces downwards.

- Any droplets that formed on the bags were carefully wiped off.

- The bags were weighed which gave $A_{(15s)}$, in other words the weight of the bag after 15 seconds measured to an accuracy of 0.0001 g.

- The bags were placed in soak, taken up and allowed to drip after <u>total</u> absorption times of 30 sec., 45 sec., 1, 2, 5, 30 and 60 minutes, which gave $A_{(30s)}$, $A_{(45s)}$, $A_{(1\ m)}$, $A_{(2\ m)}$, $A_{(5\ m)}$, $A_{(30\ m)}$, $A_{(60\ m)}$.

- The test liquid was changed after each completed test.

<u>Calculations and results obtained</u>

$A_{(i)}$ = Sample weight after absorption, g

i = 15 s, 30 s, 45 s, 1 m, 2 m, 5 m, 30 m, 60 m

P = Empty bag weight, g

S = Weight of superabsorbent, g

$D_{(i)}$ = Sample absorption, g/g

K = Bag absorption correction

K = 1.6 for i = 15 s, 30 s, 45 s, 1, 2, 5, 30 and 60 min.

$$D(i) = \frac{A(i)-S-(P\times K)}{S}$$

The results are gathered in Table 1, where IM 7110 is the partially neutralised superabsorbent and IM 7100 is the

conventional superabsorbent. It will be evident from the results that in the case of the partially neutralised superabsorbent IM 7110 absorption is at all times lower than the absorption of the conventional superabsorbent. The results are also shown in Fig. 2, where the absorption D is plotted against time. The curve representing the partially neutralised superabsorbent constantly lies beneath the curve representing the conventional superabsorbent.

Table 1

	Absorption (g/g)	
TIME	IM 7110	IM 7100
15 sec.	2.4	8.0
30 sec.	18.3	22.9
45 sec.	25.9	32.9
1 min.	28.4	36.9
2 min.	29.6	39.3
5 min.	30.9	40.3
30 min.	32.0	40.5
60 min.	32.8	40.1

All products that are worn in direct contact with the skin can lead to undesired side effects. These side effects can be the result of occlusion, the presence of moisture and factors of a mechanical, microbial and enzymatic nature, and can result in skin irritation, primary or secondary skin

infections and undesired odours. An increase in pH is a normal occurrence when absorption products are worn against the skin. However, several undesired side effects can occur as a result of or in conjunction with an increase in pH. An example of such undesired side effects is Irritative contact dermatitis which has connection with the surface pH of the skin.

Another example of undesired side effects is that certain bacteria, such as Proteus, are able to metabolise the substances in urine and other body fluids and therewith give rise to malodorous substances, such as ammonia and amines, which also cause the pH to increase. The equilibrium of many odorous substances is displaced at high pH values so as to produce more volatile components and therefore become more odorous than at low pH values.

The growth of micro-organisms is also favoured by an environment such as that found in an absorbent article, where moisture, nutrients and heat are available among other things. High bacteria numbers constitute an infection risk. Furthermore, a high bacteria count also increases the risk of embarrassing malodours caused by the various substances that are formed by the biological or chemical degradation of body fluid constituents, such as the constituents of urine and menstrual fluid. The activity of micro-organisms is greatly dependent on pH and decreases with falling pH values.

The pH is lower when the absorbent structure includes partially neutralised superabsorbent material in accordance with the invention. The aforementioned undesired side effects are thus abated in an absorbent structure according to the invention.

Partially neutralised superabsorbent material is used in absorbent articles described in Swedish Patent Application SE 9702298-2. A reduction in pH value is achieved by virtue of the absorbent structure in the article including a pH-regulating substance in the form of a partially neutralised superabsorbent material. It has been observed that a pronounced inhibiting effect is obtained on undesired strains of micro-organisms and that the occurrence of undesired side effects that may result from wearing the article is reduced when the pH of the absorbent article after wetting lies in the range of 3.5-4.9.

Examples of the relationship between degree of neutralisation and the pH of the superabsorbent material will be evident from the following Table. The data included in the Table has been taken from SE 9702298-2.

Degree of neutralisation %	pH
18	4.0
25	4.3
30	4.5
35	4.7
45	5.0
60	5.5

The degree of neutralisation of the inventive superabsorbent material lies between 20 and 50%.

Another advantage afforded by the invention is that the occurrence of malodours and skin complaints that may arise from wearing an absorbent article in direct contact with the skin are avoided. The growth-inhibiting effect is based on the observation that the activity of many micro-organisms is greatly dependent on pH and diminishes with decreasing pH, and hence lowering of the pH value will result in diminished activity of the majority of micro-organisms. Enzymes, such as lipases and proteases, have an activity which is highly pH-dependent and which diminishes with decreasing pH values, and hence a lowering of pH values will also result in diminished enzyme activity and therewith a reduction in the negative skin influence of such activity.

The following examples illustrate the effect achieved in absorbent articles that have an absorbent body which comprises partially neutralised superabsorbent material, in

comparison with conventional materials of a corresponding kind.

An absorbent body that contains absorbent material and absorbed liquid is, by nature, a heterogeneous system from a pH aspect. The system may include superabsorbent material, fibres and liquid that contains several types of ions. In order to obtain reproducible pH values, measurements must be taken at several places in the sample body and the mean value calculated on the basis thereof.

DESCRIPTION OF EXAMPLES 2, 3, 4 and 5

Test liquid

Sterile synthetic urine to which a micro-organism growth medium had been added. The synthetic urine contained monovalent and divalent cations and anions and urea and had been prepared in accordance with information set forth in Geigy, Scientific Tables, Vol. 2, 8th Ed., 1981, p. 53.

The micro-organism growth medium was based on information relating to Hook media and FSA media for enterobacteria. The mixture had a pH of 6.6.

TEST METHODS

Method 1, manufacture of absorbent test bodies

Absorbent bodies were produced with the aid of a slightly modified sample body former according to SCAN C 33:80. Fluff pulp and superabsorbent material of desired kind were weighed out, whereafter a uniform mixture of fluff pulp and superabsorbent material was passed in an air stream at a subpressure of about 85 mbar through a pipe having a diameter of 5 cm and provided with a bottom-carried metal net and thin tissue placed on said net. The mixture of fluff pulp and superabsorbent material was collected on the tissue disposed on the metal net and formed the absorbent body. The absorbent body was then weighed and compressed to a bulk density of 6-12 cm^3/g. A number of absorbent bodies designated Sample 1 and Sample 2 of mutually different compositions were then produced as described below. Sample 1 contained superabsorbents IM 7100, i.e. conventional superabsorbents, and Sample 2 contained partially neutralised superabsorbents IM 7110.

The absorbent bodies contained chemical cellulose pulp named Korsnäs EA.

The absorbent bodies had a total individual weight of 0.98 g.

The superabsorbent material weight 0.39 gram.

The chemical cellulose pulp weighed 0.59 gram.

Method 2, measuring the pH of the absorbent body

An absorbent body having a diameter of about 50 mm was manufactured in accordance with Method 1. 14 ml of test liquid were added to an absorbent body, sample 1, and 11 ml

of test liquid were added to another absorbent body, sample 2, and the absorbent bodies then allowed to swell for 30 min. (Different volumes of liquid were added since the amount of liquid absorbed by the superabsorbents varies.) The pH of respective absorbent bodies was then measured with the aid of a surface electrode, Flatbottnad Metrohm pH meter, Beckman Ø12 or Ø72. Parallel measurements were taken on at least two mutually different absorbent bodies. pH was measured at 10 points on each absorbent body and the mean value then calculated.

Method 3, measuring bacteria inhibition in absorbent bodies

Bacteria suspensions of Escherichia coli (E.c.), Proteus mirabilis (P.m.), Enterococcus faecalis (E.f.) were cultivated in nutrient broth (Nutrient Broth Oxoid CMI) overnight at a temperature of 30°C. The graft cultures were diluted and the bacteria contents calculated. The cultures were mixed in different proportions, so that the final blend culture contained about 10^4 organisms per ml synthetic urine. 10 ml of the synthetic urine were poured into a sterile sputum jar 70.5 x 52 mm, volume 100 ml, and the absorbent body was placed up-side-down in the jar and allowed to absorb liquid for 5 min., whereafter the jar was turned and incubated at 35°C for 0,6 and 12 hours respectively, whereafter the bacteria value in the absorbent body was determined. TGE agar was used as the nutrient for measuring the total number of bacteria while Drigalski agar was used for measuring specifically Escherichia coli and Proteus mirabilis, while Slanetz Bartley agar was used for specifically measuring Enterococcus faecalis. The results are shown in the tables below.

TEST RESULTS

Example 2

It will be evident from Table 2 that the absorbent body according to Sample 2 comprising partially neutralised superabsorbents IM 7110 effectively inhibited the growth of Esherichia coli.

Table 2

Esherichia coli	0 hours	6 hours	12 hours
Sample 1	3.5	7.3	8.9
Sample 2	3.5	3.7	3.3

Example 3

It will be evident from Table 3 that the growth of Proteus mirabilis was effectively prohibited in Sample 2, which consisted of an absorbent body that included partially neutralised superabsorbents IM 7110.

Table 3

Proteus mirabilis	0 hours	6 hours	12 hours
Sample 1	3.2	6.3	9
Sample 2	3.2	<2	<2

Example 4

It will be evident from Table 4 that the growth of Enterococcus faecalis was effectively inhibited in Sample 2, which consisted of an absorbent body that included partially neutralised superabsorbents IM 7110.

Table 4

Enterococcus faecalis	0 hours	6 hours	12 hours
Sample 1	3.4	6.3	7.6
Sample 2	3.4	3.3	3.4

The measurements in Examples 2-4 were made in accordance with Method 3.

It will be evident from Examples 2-4 that inhibition of micro-organism growth was good when using a partially neutralised superabsorbent in an absorbent body.

Example 5

As will be evident from Table 5, the pH of an absorbent body consisting of Sample 1 that included conventional superabsorbent has a higher pH, above 6 and up to 8.7, after 12 hours. A lower pH of 4.6 is obtained in Sample 2 containing partially neutralised superabsorbent, thus a value which is suitable for inhibiting the growth of micro-organisms.

Table 5

pH	0 hours	6 hours	12 hours
Sample 1	6.1	6.2	8.7
Sample 2	4.6	4.6	4.6

The measurements were made in accordance with Method 2.

The invention thus relates to an absorbent structure in absorbent articles, such as diapers, pants diapers, incontinence protectors, sanitary napkins, panty liners and like articles, wherein the structures comprises at least 40 percent by weight superabsorbent material based on the total weight of the absorbent structure in a dry state in the region or regions where the superabsorbent material is distributed, and wherein the superabsorbent material has a degree of neutralisation between 20 and 50%. A preferred degree of neutralisation is between 25 and 35%. At degrees of neutralisation between 20 and 50%, or between 25 and 35%, there is obtained a pH which is beneficial in counteracting the growth of micro-organisms for instance and in ablating undesired side effects. This also allows the article to be worn for a longer period of time, as a result of lowering the pH and also as a result of the higher absorption capacity of the inventive article. This longer use period afforded by the absorbent structure is highly beneficial coupled with the advantageous slower absorption rate and the lower total absorption of the individual superabsorbent particles, which reduces the risk of gel blocking and lump formations.

The amount of superabsorbent material present may lie between 40 and 50 percent by weight, based on the total weight of the absorbent structure in a dry state. The proportion of superabsorbent, however, may be higher, for instance up to 90 percent by weight. The absorbent structure may also be comprised solely of superabsorbent material.

The aforesaid proportion of superabsorbent material in the absorbent structure is primarily based on the total weight of the absorbent structure in a dry state in the region or regions in which the superabsorbent material is distributed.

Partially neutralised superabsorbent material is used chiefly in the absorbent structure according to the invention. However, the absorbent structure may also include conventional superabsorbent material. In this case, the partially neutralised superabsorbent may be placed in the wetting region while placing the conventional superabsorbent outside said wetting region. One advantage of localising the superabsorbent material that has the lowest degree of neutralisation in the wetting area of the article, i.e. in the crotch area of the article, and localising conventional superabsorbent material in the end parts of the article is that liquid dispersion is enhanced in such a structure from the wetting region to the end parts of said article. This enables the extent to which the total absorption capacity of the absorbent structure is utilised to be increased and also to reduce the danger of gel blocking in the wetting region.

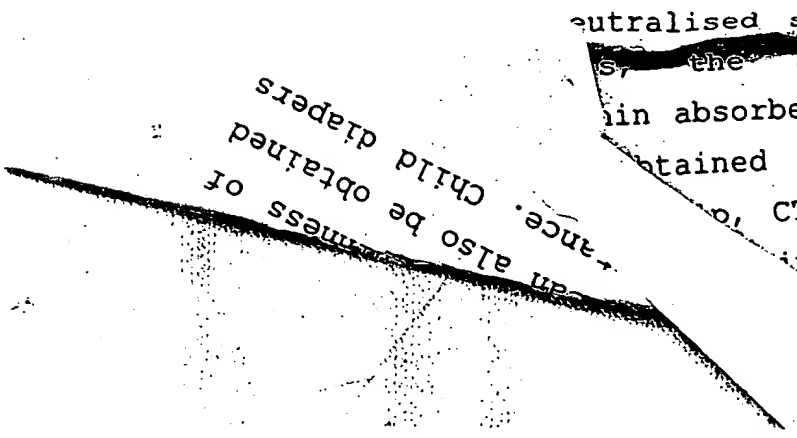
Alternatively, superabsorbent distribution may be one in which the partially neutralised superabsorbent is placed in a first zone closer to the wearer, while the conventional superabsorbent is localised in a second zone which is located

beneath the first zone as seen in a direction from the wearer of the absorbent article. This provides the same advantages as those mentioned above, because liquid will spread from the zone in which the degree of neutralisation is lowest and in which liquid is received first, to the zone containing conventional superabsorbent material. Exploitation of the absorbent article can be increased and the risk of gel blocking in the sheet or layer closest to the wearer reduced.

A further example is that the partially neutralised superabsorbent is placed in a layer or sheet in the bottom or lower part of the structure, which hereby can work as a liquid dispersion sheet or layer.

The concentration of the partially neutralised superabsorbent material in the aforedescribed examples may be at least 40 percent by weight in those regions in which said partially neutralised superabsorbent material is placed.

However, in the preferred embodiments the partially neutralised superabsorbent material is included with the sole purpose of achieving the decrease in pH desired for ablating the undesired side effects.



In a preferred embodiment of the invention, the absorbent structure includes dry-formed, compressed CTMP pulp, CP pulp or the like, besides partially neutralised superabsorbent. The absorbent structure is conventionally formed into a mat which is then highly compressed. This results in a very thin absorbent structure. In this case, partially neutralised superabsorbent is mixed in the core. For instance, the superabsorbent may be mixed homogeneously with the cellulose fibres in a so-called mixed layer, or placed between two cellulose-based layers. As with the aforedescribed structure, the amount of neutralised superabsorbent present will correspond to at least 40 percent by weight based on the total weight of the absorbent structure in a dry state in the region or regions in which the superabsorbent material is distributed. The degree of neutralisation is between 20 and 50%, preferably between 25 and 35%.

The use of dry-formed, compressed CTMP pulp, CP pulp or the like in the absorbent structure results in a thin product that can be worn discretely. The undesired side effects, such as malodours and skin irritations are avoided at the same time, as described above. The aforementioned drawbacks in the form of gel blocking and lump formation are also avoided, and a high absorption capacity is achieved.

Characteristic features of the compressed inventive structure are that the core is thin prior to being wetted and swells and disperses liquid instantaneously as it is wetted. The use of dry-formed, compressed paper pulp in the absorbed structure enables the structure to be given a thinness of from 1 to 3 mm. Cores as thin as 0.5 mm can also be obtained and then used in panty liners, for instance. Child diapers

need to have a higher absorption capacity, suitable thicknesses in this respect being in the order of up to 8 mm. Preferred thicknesses are from 1 to 8 mm and from 1 to 3 mm respectively.

Wearer comfort is retained in spite of the high concentration of superabsorbent, because the partially neutralised superabsorbent has a slower absorbent rate and a lower absorption capacity.

The invention also relates to absorbent articles, such as diapers, pants diapers, incontinence protectors, sanitary napkins, panty liners and like articles that include an upper liquid-permeable sheet, a lower liquid-impermeable barrier sheet, and an absorbent structure enclosed therebetween, said absorbent structure being of the kind described above.

Absorbent articles also normally include an acquisition/transportation layer between the upper liquid-permeable top sheet and the absorbent structure. An acquisition/transportation layer has an open and airy structure and functions to rapidly accept a given volume of liquid and to rapidly conduct this liquid to the absorbent structure. The acquisition/transportation layer may be sed of a nonwoven material, which can be produced by bonding and carding or by needling of synthetic olyester, polypropylene or mixtures thereof. acquisition/transportation layer y of synthetic, relatively hydrophobic ed in that which relates to the present patent application. An the invention can, on the on/transportation layer.

absorbent article according to the invention can, on the other hand, include such an acquisition/transportation layer.

According to one preferred embodiment, the article is an incontinence product or a feminine product.

By the word "comprise" as used in this document is meant include although with no limitation.

CLAIMS

1. An absorbent structure in absorbent articles such as diapers, pants diapers, incontinence protectors, sanitary napkins, panty liners and like articles, **characterised** in that the structure comprises at least 40 percent by weight superabsorbent material based on the total weight of the absorbent structure in a dry state in the region or in these regions in which the superabsorbent material is distributed, wherein said superabsorbent material has a degree of neutralisation between 20 and 50%.

2. An absorbent structure according to Claim 1, **characterised** in that the degree of neutralisation is between 25 and 35%.

3. An absorbent structure according to any one of the preceding Claims, **characterised** in that the absorbent structure includes dry-formed, compressed CTMP pulp, CP pulp or like pulp, in addition to superabsorbent material.

4. An absorbent structure according to Claim 3, **characterised** in that the absorbent structure has a thickness of 1 mm to 8 mm when dry.

5. An absorbent structure according to Claim 3, **characterised** in that said structure has a thickness of 1 mm to 3 mm when dry.

6. An absorbent structure according to any one of the preceding Claims, **characterised** in that said absorbent article is intended for incontinence protectors or feminine products.

7. An absorbent article such as a diaper, pant diaper, incontinence protector, sanitary napkin, panty liner and the like, comprising an upper liquid-permeable sheet, a bottom liquid-impermeable barrier sheet, and an absorbent structure enclosed therebetween, **characterised** in that the absorbent structure is of the kind defined in one or more of Claims 1 to 6.

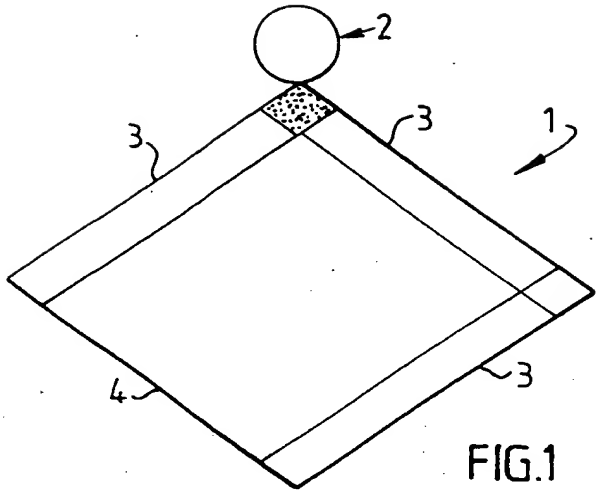

2
3
3
1
4
3

FIG.1

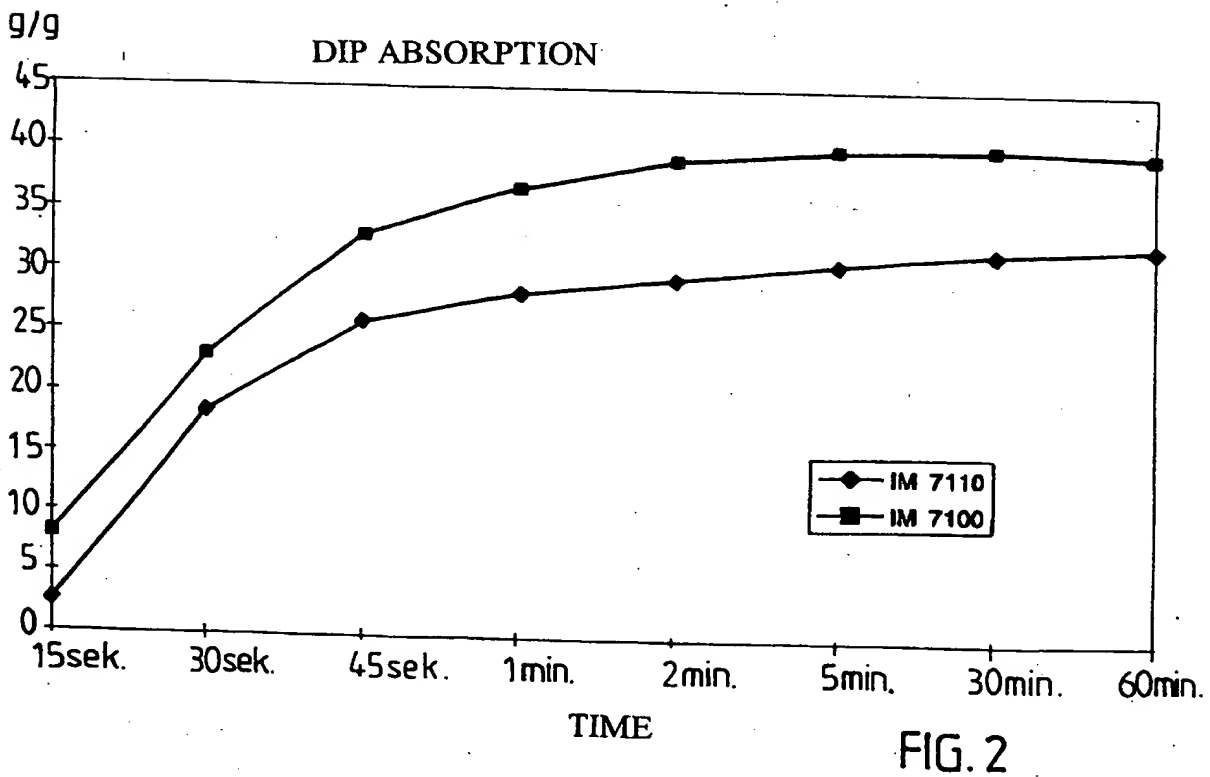

g/g
DIP ABSORPTION
45
40
35
30
25
20
15
10
5
0
15sek.
30sek.
45sek.
1min.
2min.
5min.
30min.
60min.
TIME
IM 7110
IM 7100

FIG. 2

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 16 August 2000 (16.08.00)	
International application No. PCT/SE99/02371	**Applicant's or agent's file reference** 52430-58018
International filing date (day/month/year) 15 December 1999 (15.12.99)	**Priority date** (day/month/year) 16 December 1998 (16.12.98)
Applicant PORSÖ, Berith et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

13 July 2000 (13.07.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Charlotte ENGER
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
52430-58018		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE99/02371	15/12/1999	16/12/1998
International Patent Classification (IPC) or national classification and IPC A61L15/60		
Applicant SCA HYGIENE PRODUCTS AB et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☒ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13/07/2000	09.04.01
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Blott, C Telephone No. +49 89 2399 7538

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE99/02371

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-9,12-15,17, 20-26	as originally filed	
10,11,16,18,19	with telefax of	18/12/2000

Claims, No.:

1-9	with telefax of	18/12/2000

Drawings, sheets:

1/1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
   see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-9
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-9
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations
   see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

   see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

SECTION I

1. The applicant did not provide a document showing that IM 7100 and IM 7110 are equivalent to Hysorb C7100 and Hysorb C7110. The amendment of IM 7100 and IM 7110 into Hysorb C7100 and Hysorb C7110 in the description on pages 10, 11, 16, 18 and 19, filed with telefax dated 18/12/00, may therefore introduce subject-matter which extends beyond the content of the application as filed and is contrary to Article 34(2)(b) PCT. This report has therefore been established as if this amendment has not been made.

SECTION V

2. a) The following documents, which were cited in the International Search Report, are referred to in this report; the numbering will be adhered to in the rest of the procedure:

   D1: EP 0202126

   D2: EP 0391108

   The following document is cited by the IPEA. The numbering will be adhered to in the rest of the procedure:

   D3: WO 98 57677

   D3 is a family member of SE 9 702 298, which has been cited in the present application (cf. page 13, lines 1-12).

   b) D1 refers to absorbent articles with an absorbent core containing hydrophilic fibre material and a water insoluble hydrogel material in a weight ratio of from 30:70 to 98:2 (cf. claims 1, 8 and page 8, lines 9-14). The hydrogel material falls within the definition of superabsorbent materials (cf. definition in present description page 3, lines 27- 30). In example 9, the core of patch n°3 contains 20% hydrogel, which has a degree of neutralisation of 34%. Nevertheless, D1 does not disclose explicitly an absorbent structure comprising at least 40% of a surperabsorbent material having a degree of neutralisation between 20 and 50%. D1 does not specify the thickness of the absorbent core.

   c) D2 refers to hydrophilic, swellable graft polymers, which are suitable partially neutralised superabsorbents that can be used in accordance with the present invention (cf. claim 1 and present description page 6, line 34 to page 7, line 2). The

neutralisation degree of the polymers of D2 are from 25-80% (cf. Table II, page 9). D2 is neither concerned with the proportions of these polymers in an absorbent structure nor the thickness of such a structure.

d) D3 is a patent application from the present applicant which was published between the priority and the filing date of the present application (cf. section VI 5.). Initially, the same absorbent structure was claimed in claim 1 of the present application, as in D3. With telefax of 18/12/2000, the applicant restricted the subject-matter of claim 1 to absorbent structures having a thickness of 1-8 mm when dry. Since D3 does not specify the thickness of the absorbent structure, D3 is not relevant any more (cf. Rule 64.3 PCT and section VI).

3. Novelty

a) The subject-matter of claim 1 is an absorbent structure having a thickness of 1-8 mm when dry, comprising at least 40% by weight superabsorbent material based on total weight of the structure in a dry state in the region(s) where said material is distributed. The superabsorbent material has a degree of neutralisation between 20 and 50%.
None of the aforementioned documents discloses nor anticipates an absorbent structure having a thickness as defined in claim 1.
The subject-matter of claim 1 therefore is new over the cited prior art (Art. 33(2) PCT)

b) Item a) also applies to dependent claims 2-8 (Art. 33(2) PCT).

c) The subject-matter of claim 9 is an absorbent article comprising an upper liquid-permeable sheet, a bottom liquid-impermeable barrier sheet and an absorbent structure as defined in one or more of claims 1-8.
Since the absorbent structure is new over the cited prior art (cf. item 3.a)), the subject-matter of claim 9 is also new over the prior art (Art. 33(2) PCT).

4. Inventive step

a) D1, which is considered to represent the closest prior art, refers, as already mentioned under item V 2.b), to absorbent articles with an absorbent core containing hydrophilic fibre material such as cellulose fibres and a water insoluble hydrogel material in a weight ratio of from 30:70 to 98:2. The hydrogel material falls within the

definition of superabsorbent materials. In example 9, the core of patch n°3 contains 20% hydrogel, which has a degree of neutralisation of 34%.
As mentioned in the present application, partially neutralized superabsorbent materials with a degree of neutralization of 20-50% have a lower absorption capacity than conventional superabsorbent materials, which have a degree of neutralization of about 70%. Therefore, they do not swell as much and the risk of gel blocking is reduced (cf. page 3, lines 5-29, page 5, lines 25-34 and claim 1). This propriety is inherent to the absorbent core of patch n°3 described in example 9 of D1, which has a degree of neutralisation of 34%.

Consequently, the subject-matter of claim 1 differs from the aforementioned example 9 only in that the absorbent structure contains at least 40% of the superabsorbent material and that the structure has a thickness of 1-8 mm.

It is already known from D1 that the weight ratio of hydrophilic fibre to hydrogel is from 30:70 to 98:2, preferably from 50:50 to 95:5 (cf. claims 8, 9).

When trying to conceive an absorbent structure, the man skilled in the art would therefore take into consideration a ratio of fibre to hydrogel such as 50:50. Especially when starting from example 9, he would expect an improved absorbency capacity when increasing the amount of superabsorbent in example 9 to such a ratio.

Moreover, the determination of the thickness of such a structure in accordance with the utilized material is a matter of routine for the skilled person. It is an obvious matter that absorbent articles, such as for example panty liners, should be as thin as possible. Currently marketed absorbent articles, especially panty liners, already have a thickness falling within the definition of claim 1.

Hence, the IPEA considers that the subject-matter of claim 1 is easily derivable from D1 for the skilled person and does not involve an inventive step (Art. 33(3) PCT).

b) Dependent claims 2-8 do not contain any features which, in combination with the features of claim 1 to which they refer, meet the requirements of the PCT in respect of inventive step, since their subject-matter is easily derivable from D1 or represents a matter of routine for the skilled person.

c) According to item 4.a), an absorbent structure as defined in claim 1 is easily derivable from the prior art.
Furthermore, the absorbent articles described in D1 comprise an absorbent core positioned between a liquid impervious backing sheet and a liquid pervious top sheet (cf. page 3, lines 20-29). For the man skilled in the art, it would therefore be a matter of routine, when conceiving an absorbent article, to combine a structure as defined in claim 1 with an upper-liquid permeable sheet and a bottom liquid-impermeable sheet.

Thus, the subject-matter of claim 9 is derivable from the prior art and does not involve an inventive step (Art. 33(3) PCT).

SECTION VI

5. Certain published documents (Rule 70.10)

Application No Patent No	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date *(valid claim)* *(day/month/year)*
WO 98/57677 (D3)	23.12.98	10.06.98	17.06.97

D3 discloses absorbent articles with an absorbent body. D3 does not disclose nor anticipate the thickness of said absorbent body. (Cf. section V 2.d)).

SECTION VIII

6. The abbreviations IM 7100 and IM 7110 used in the description as originally filed are unclear (Art. 6 PCT). (Cf. Section I 1.)

7. It seems that the wording of claim 1, line 12 should be "...between 20 and 50% and in that the absorbent structure has a thickness of ..." (Art. 6 PCT).

8. Dependent claim 7 refers to an "absorbent article", which is not consistent with independent claim 1, which refers to an "absorbent structure" (Art. 6 PCT).

9. The term "conventional" used in claims 6 and 7 is vague and unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear (Art. 6 PCT).

CLAIMS

1. An absorbent structure for absorbent articles such as diapers, pants diapers, incontinence protectors, sanitary napkins, panty liners, **characterised** in that the structure comprises at least 40 percent by weight superabsorbent material based on the total weight of the absorbent structure in a dry state in the region or in these regions in which the superabsorbent material is distributed, wherein said superabsorbent material is a partially neutralised superabsorbent material having a degree of neutralisation between 20 and 50% the absorbent structure has a thickness of 1 mm to 8 mm when dry.

2. An absorbent structure according to Claim 1, **characterised** in that the degree of neutralisation is between 25 and 35%.

3. An absorbent structure according to any one of the preceding Claims, **characterised** in that the absorbent structure includes dry-formed, compressed CTMP pulp or CP pulp, in addition to superabsorbent material.

4. An absorbent structure according to any of the preceding Claims, **characterised** in that said structure has a thickness of 1 mm to 3 mm when dry.

5. An absorbent structure according to any one of the preceding Claims, **characterised** in that said absorbent

article is intended for incontinence protectors or feminine products.

6. An absorbent structure according to any of the preceding claims, characterised in that the partially neutralised superabsorbent material is placed in the wetting region and conventional superabsorbent material having a degree of neutralisation of about 70% is placed outside the wetting region.

7. An absorbent article according to any of claims 1-5, characterised in that the structure comprises a first zone closer to the wearer including the partially neutralised superabsorbent material and a second zone which is located beneath the first zone in a direction form the wearer of the absorbent article, wherein the second zone comprises conventional superabsorbent material having a degree of neutralisation of about 70%.

8. An absorbent structure according to any of claim 1-5, characterised in that the partially neutralised superabsorbent is placed in a layer or sheet in the bottom or lower part of the structure.

9. An absorbent article such as a diaper, pant diaper, incontinence protector, sanitary napkin, panty liner, comprising an upper liquid-permeable sheet, a bottom liquid-impermeable barrier sheet, and an absorbent structure enclosed therebetween, characterised in that the absorbent structure is of the kind defined in one or more of Claims 1 to 8.

- The bags were weighed which gave $A_{(15s)}$, in other words the weight of the bag after 15 seconds measured to an accuracy of 0.0001 g.

- The bags were placed in soak, taken up and allowed to drip after total absorption times of 30 sec., 45 sec., 1, 2, 5, 30 and 60 minutes, which gave $A_{(30s)}$, $A_{(45s)}$, $A_{(1\ m)}$, $A_{(2\ m)}$, $A_{(5\ m)}$, $A_{(30\ m)}$, $A_{(60\ m)}$.

- The test liquid was changed after each completed test.

Calculations and results obtained

$A_{(i)}$ = Sample weight after absorption, g

i = 15 s, 30 s, 45 s, 1 m, 2 m, 5 m, 30 m, 60 m

P = Empty bag weight, g

S = Weight of superabsorbent, g

$D_{(i)}$ = Sample absorption, g/g

K = Bag absorption correction

K = 1.6 for i = 15 s, 30 s, 45 s, 1, 2, 5, 30 and 60 min.

$$D(i) = \frac{A(i)-S-(P\times K)}{S}$$

The results are gathered in Table 1, where Hysorb C7110 (BASF) is the partially neutralised superabsorbent and Hysorb C7100 (BASF) is the

conventional superabsorbent. It will be evident from the results that in the case of the partially neutralised superabsorbent Hysorb C7110 (BASF) absorption is at all times lower than the absorption of the conventional superabsorbent. The results are also shown in Fig. 2, where the absorption D is plotted against time. The curve representing the partially neutralised superabsorbent constantly lies beneath the curve representing the conventional superabsorbent.

Table 1

	Absorption (g/g)	
TIME	Hysorb C7110 (BASF)	Hysorb C7100 (BASF)
15 sec.	2.4	8.0
30 sec.	18.3	22.9
45 sec.	25.9	32.9
1 min.	28.4	36.9
2 min.	29.6	39.3
5 min.	30.9	40.3
30 min.	32.0	40.5
60 min.	32.8	40.1

All products that are worn in direct contact with the skin can lead to undesired side effects. These side effects can be the result of occlusion, the presence of moisture and factors of a mechanical, microbial and enzymatic nature, and can result in skin irritation, primary or secondary skin

Method 1, manufacture of absorbent test bodies

Absorbent bodies were produced with the aid of a slightly modified sample body former according to SCAN C 33:80. Fluff pulp and superabsorbent material of desired kind were weighed out, whereafter a uniform mixture of fluff pulp and superabsorbent material was passed in an air stream at a subpressure of about 85 mbar through a pipe having a diameter of 5 cm and provided with a bottom-carried metal net and thin tissue placed on said net. The mixture of fluff pulp and superabsorbent material was collected on the tissue disposed on the metal net and formed the absorbent body. The absorbent body was then weighed and compressed to a bulk density of 6-12 cm^3/g. A number of absorbent bodies designated Sample 1 and Sample 2 of mutually different compositions were then produced as described below. Sample 1 contained superabsorbents Hysorb C7100 (BASF), i.e. conventional superabsorbents, and Sample 2 contained partially neutralised superabsorbents Hysorb C7110 (BASF).

The absorbent bodies contained chemical cellulose pulp named Korsnäs EA.

The absorbent bodies had a total individual weight of 0.98 g.

The superabsorbent material weight 0.39 gram.

The chemical cellulose pulp weighed 0.59 gram.

Method 2, measuring the pH of the absorbent body

An absorbent body having a diameter of about 50 mm was manufactured in accordance with Method 1. 14 ml of test liquid were added to an absorbent body, sample 1, and 11 ml

.TEST RESULTS

Example 2

It will be evident from Table 2 that the absorbent body according to Sample 2 comprising partially neutralised superabsorbents Hysorb C7110 (BASF) effectively inhibited the growth of Escherichia coli.

Table 2

Escherichia coli	0 hours	6 hours	12 hours
Sample 1	3.5	7.3	8.9
Sample 2	3.5	3.7	3.3

Example 3

It will be evident from Table 3 that the growth of Proteus mirabilis was effectively prohibited in Sample 2, which consisted of an absorbent body that included partially neutralised superabsorbents Hysorb C7110 (BASF).

Table 3

Proteus mirabilis	0 hours	6 hours	12 hours
Sample 1	3.2	6.3	9
Sample 2	3.2	<2	<2

Example 4

It will be evident from Table 4 that the growth of Enterococcus faecalis was effectively inhibited in Sample 2, which consisted of an absorbent body that included partially neutralised superabsorbents Hysorb C7110 (BASF).

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REQUEST

The undersigned request that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No. PCT/SE99/02371

International Filing Date 15-12-1999

The Swedish Patent Office
PCT International Application

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference (*if desired*) (*12 characters maximum*) 52430-58018

Box No. I **TITLE OF INVENTION**

An absorbent structure in an absorbent article, comprising a partially neutralised superabsorbent material, and an absorbent article that comprises the absorbent structure

Box No. II **APPLICANT**

Name and address: (*Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.*)

SCA Hygiene Products AB

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☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (*that is, country*) of nationality: SE

State (*that is, country*) of residence: SE

This person is the applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No III **FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: *Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.*)

Berith PORSÖ
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SE-433 30 PARTILLE, Sweden

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (*If this check-box is marked, do not fill in below.*)

State (*that is, country*) of nationality: SE

State (*that is, country*) of residence: SE

This person is the applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV **AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: (*Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.*)

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PCT/SE 99/02371

Continuation of Box No. III **FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)** 15 -12- 1999

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- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

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Name and address: *Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

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- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality: SE

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Name and address: *Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

Jan HANSSON
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This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality: SE

State *(i.e. country)* of residence: SE

This person is the applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

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This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality:

State *(i.e. country)* of residence:

This person is the applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

PCT/SE99/02371
15-12-1999

Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

☒ **AP** **ARIPO Patent: GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SL** Sierra Leone, **SZ** Swaziland, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting state of the Harare Protocol and of the PCT

☒ **EA** **Eurasian Patent: AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

☒ **EP** **European Patent: AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **CY** Cyprus, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is Contracting State of the European Patent Convention and of the PCT

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Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

PCT/SE99/02371
15-12-1999

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: National application: country:	regional application:* regional Office	international application: receiving Office
item (1) 16 December 1998 16/12/98	9804361-5	SE		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s) : 1

* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(If two or more international Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*
ISA /SE

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*
Date (*day/month/year*): Number Country (*or regional Office*)
~~19 July 1999~~ 16.12.1998 SE 98/01442 SE

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request:	4
description (excluding sequence listing part):	19
claims:	2
abstract:	1
drawings:	1
sequence listing part of description:	
Total number of sheets:	27

This international application is **accompanied by** the item(s) marked below:

1. ☒ Fee calculation sheet
2. ☐ Separate signed power of attorney
3. ☐ Copy of general power of attorney; reference number, if any:
4. ☐ Statement explaining lack of signature
5. ☐ Priority document(s) identified in Box No. VI as item(s):
6. ☐ Translation of international application into (language):
7. ☐ Separate indications concerning deposited microorganism or other biological material
8. ☐ Nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other *(specify): SE 98/01442*

Figure of the drawings which should accompany the abstract:

Language of filing of the International application: Swedish

Box No. IX SIGNATURE OR APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Kristina Axell 15 December 1999

For receiving Office use only

1. Date of actual receipt of the purported international application: 15-12-1999	2. Drawings: ☒ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT-Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA/SE 6. ☐ Transmittal of search copy delayed until search fee is paid	

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Date of receipt of the record copy by the International Bureau: 03 FEBRUARY 2000 (03.02.00)

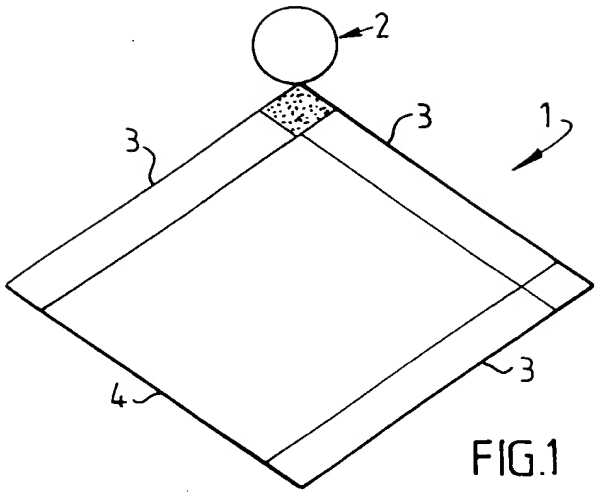
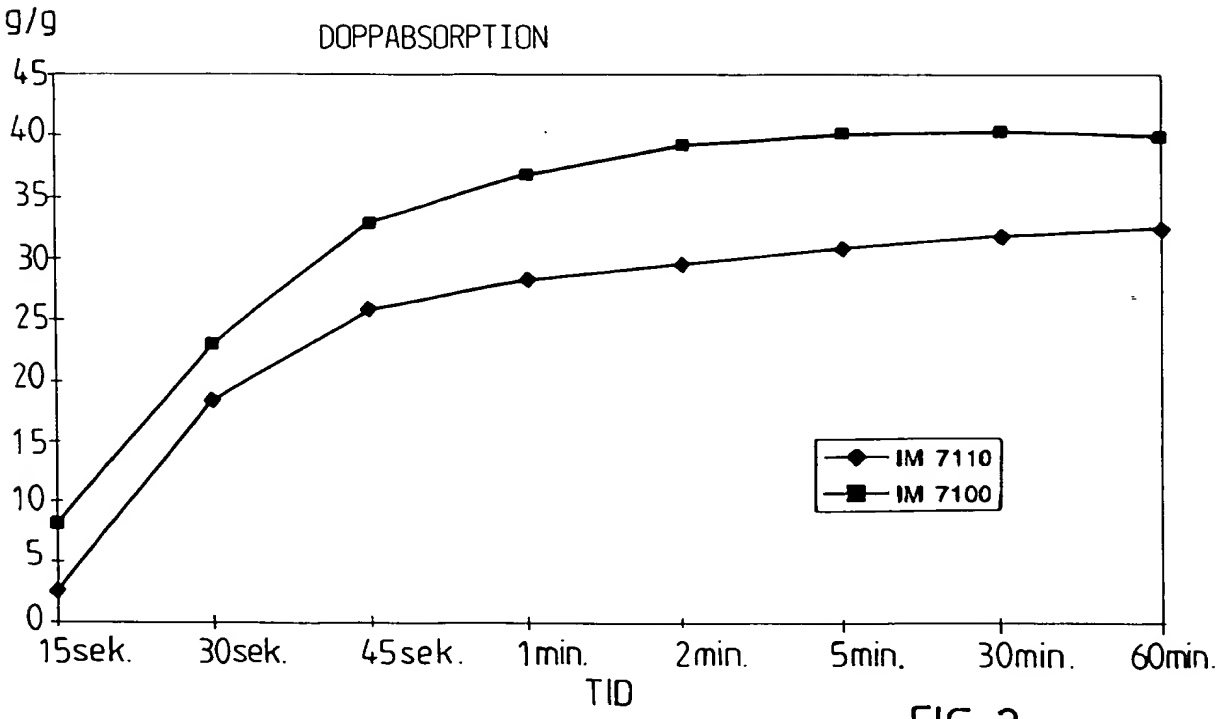

2
3
3
1
3
4

FIG.1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15sek.
30sek.
45sek.
1min.
2min.
5min.
30min.
60min.
TID
IM 7110
IM 7100

FIG. 2

Absorberande struktur i ett absorberande alster, innefattande ett delvis neutraliserat superabsorberande material, samt ett absorberande alster innefattande den absorberande strukturen.

Föreliggande uppfinning avser en absorberande struktur i ett absorberande alster såsom en blöja, blöjbyxa, inkontinensskydd, dambinda, trosskydd eller liknande, innefattande ett delvis neutraliserat superabsorberande material, samt ett absorberande alster innefattande den absorberande strukturen.

Bakgrund

Ett absorberande alster består vanligen av ett övre vätskegenomträngligt skikt, ett absorberande skikt och ett undre vätskeogenomträngligt spärrskikt, vilka avgränsas av två tvärgående kanter och två längsgående kanter. Alstret innefattar fram- och bakparti samt däremellan beläget grenparti med ett vätområde inom vilket huvuddelen av kroppsvätskan avges. Det absorberande skiktet innefattar ofta ett superabsorberande material.

Det superabsorberande materialet föreligger i partikelform, t ex korn, granuler, flingor eller fibrer, och blandas eller skiktas med övrigt absorptionsmaterial, vanligen cellulosafibrer. Superabsorbent är polymerer med hög förmåga att absorbera vätska såsom vatten och kroppsvätskor, tex urin och blod, under svällning och bildande en icke vattenlöslig gel. Vissa har vidare förmåga att hålla kvar absorberad vätska även då de utsätts för ett yttre tryck. De har fått stor användning i absorberande hygienprodukter såsom blöjor, dambindor, inkontinensskydd och liknande.

Effektiviteten av ett superabsorberande material är beroende av många faktorer, såsom var och hur superabsorbenten blandas in i den absorberande strukturen, partikelform och partikelstorlek, samt fysikaliska och kemiska egenskaper som absorptionshastighet , gelstyrka och vätskehållande förmåga. Ett fenomen som

kallas gelblockering kan påverka absorptionskapaciteten negativt. Gelblockering innebär att det superabsorberande materialet vid vätning bildar en gel som blockerar porerna i fiberstrukturen eller mellan partiklarna, vilket försvårar vätsketransporten från vät-området ut till resten av absorptionskroppen. Detta innebär ett dåligt utnyttjande av absorptionskroppens totala absorptionskapacitet och medför risk för läckage.

För att minska problemet med gelblockering, är det exempelvis känt att använda superabsorberande partiklar, vilka är omgivna av ett hölje som endast långsamt löses i och/eller penetreras av den vätska som skall absorberas så att det super-absorberande materialet uppvisar en fördröjd aktiveringstid. Genom WO 95/00183 är det känt med absorberande alster med en absorberande struktur som innefattar superabsorberande material med fördröjd aktiveringstid vid strukturens vätområde, och konventionellt superabsorberande material i områden utanför vätområden.

Ett annat sätt att minska problemet med gelblockering, är att använda super-absorbent som uppvisar hög gelstyrka. Superabsorbent som uppvisar hög gelstyrka har förmåga att kvarhålla absorberad vätska vid yttre belastning mot det svällda materialet, samt har även förmåga att absorbera en betydande mängd vätska vid yttre belastning. EP 0 339 461 beskriver superabsorbent för användning i absorberande alster, vilka uppvisar hög gelstyrka. Denna har förmåga att i större utsträckning bibehålla sin form och inte kollapsa vid svällning.

Genom EP 0 532 002 är det vidare känt med superabsorberande material som uppvisar hög gelstyrka och även viss vätskespridande förmåga.

Ett problem med absorberande alster, innefattande superabsorbent, är alltså gel-blockering som beskrivits ovan. Detta resulterar i en ökad risk för vätskeläckage, samt ett dåligt utnyttjande av den absorberande strukturens totala kapacitet. En annan nackdel med konventionell superabsorbent är att den sväller mycket. Om man har höga koncentrationer av superabsorbent leder det till att alstret kan vara

obehagligt att ha på sig efter vätning, då det kan bildas en svälld "klump" i vätpunkten.

Ändamålet med uppfinningen är att lösa dessa problem.

Kort beskrivning av uppfinningen

Uppfinningen avser en absorberande struktur innefattande endast delvis neutraliserad superabsorbent, vilken inte sväller lika mycket som konventionellt superabsorberande material, och därmed möjliggör högre koncentrationer av superabsorbent. Dessutom absorberar det delvis neutraliserade superabsorberande materialet vätska långsammare, vilket gör att vätskan hinner sprida sig mer innan superabsorbenten sväller, jämfört med ett konventionellt superabsorberande material. Konventionellt superabsorberande material har en neutralisationsgrad på ca 70 %.

Uppfinningen avser en absorberande struktur i absorberande alster såsom blöja, blöjbyxa, inkontinensskydd, dambinda, trosskydd eller liknande, varvid den innefattar minst 40 viktprocent superabsorberande material, baserat på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det superabsorberande materialet är fördelat, varvid det superabsorberande materialet uppvisar en neutralisationsgrad mellan 20 och 50 %.

Uppfinningen avser även ett absorberande alster innefattande den absorberande strukturen.

Genom föreliggande uppfinning är det möjligt att erhålla ett absorberande alster som är tunt, vilket medför att ett alster enligt uppfinningen känns bekvämt och diskret att bära. En ytterligare fördel med den delvis neutraliserade superabsorbenten är att den förhindrar dålig lukt och hudproblem i samband med användning av det absorberande alstret.

Figurbeskrivning

Fig. 1 visar en påse som används vid försök i Exempel 1.

Fig. 2 visar resultat från Exempel 1 i form av en kurva där absorptionen är avsatt mot tiden.

Beskrivning av uppfinningen

Uppfinningen avser en absorberande struktur innefattande delvis neutraliserat superabsorberande material, vilket löser problemet genom att ett delvis neutraliserat superabsorberande material inte sväller lika mycket och tar upp vätskan långsammare än ett konventionellt superabsorberande material, dvs ett superabsorberande material neutraliserat till ca 70 %.

Ett lämpligt, delvis neutraliserat, superabsorberande material som kan användas enligt uppfinningen, kan utgöras av t ex en tvärbunden polyakrylat av det slag som beskrivs i europeiska patentet EP 0 391 108, Casella AG.

En sådan superabsorbent sväller inte lika mycket, dvs uppvisar en lägre total vätskeabsorptionskapacitet, vilket innebär att superabsorbenten i svällt tillstånd upptar en mindre volym än superabsorberande material med en högre neutralisationsgrad. På så vis är risken för att det superabsorberande materialet, i svällt tillstånd, hindrar transporten av vätska i den porstruktur som omger det superabsorberande materialet/de superabsorberande partiklarna mindre. Ett superabsorberande material enligt uppfinningen tar dessutom upp vätska långsammare än ett superabsorberande material med en högre neutralisationsgrad. Genom att superabsorbenten tar upp vätska långsammare har en större mängd av vätskan möjlighet att spridas från vätpunkten till den absorberande strukturens övriga partier, vilket resulterar i ett högre utnyttjande av alstrets totala absorberande

kapacitet. Exempel som följer i beskrivningen visar att det delvis neutraliserade superabsorberande materialet enligt uppfinningen absorberar långsammare och absorberar mindre mängd vätska än konventionellt superabsorberande material.

Superabsorbenten består av tvärbunden polymeriserad akrylsyra. Vid neutralisationen bildas jonkomplex av COO^- och Na^+ eller K^+. Vid absorptionen sker sedan ett jonbyte mellan Na^+ och andra joner. Den delvis neutraliserade superabsorbenten innehåller färre joner (COO^-) än den konventionella superabsorbenten. Jonerna (COO^-) är tillgängliga för att absorbera vätska och färre sådana resulterar i att den delvis neutraliserade superabsorbenten har en något lägre kapacitet. Ett större antal karboxylsyragrupper kommer att vara närvarande och dessa medverkar inte till absorptionen, men de ger ett lägre pH än för en konventionell superabsorbent.

I och med att superabsorbenten enligt uppfinningen absorberar mindre mängd vätska, kan man ha en högre koncentration av superabsorbent utan att alstret blir obekvämt att bära efter vätning. Enligt uppfinningen kan man nu använda mer än 40 viktprocent superabsorberande material, beräknat på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det superabsorberande materialet är fördelat, av det delvis neutraliserade superabsorberande materialet, utan att problemen beskrivna ovan uppkommer i lika hög grad.

Problemen som nämns ovan löses alltså genom att superabsorbenten är delvis neutraliserad. Neutralisationsgraden är 20 till 50 %, jämfört med en neutralisationsgrad hos konventionella superabsorberande material som ligger på ca 70 %.

Superabsorbent som används i den absorberande strukturen enligt uppfinningen, vilken är delvis neutraliserad, har, som tidigare nämnts, en lägre absorptionskapacitet och den är långsammare på att absorbera vätska. I och med att superabsorbenten absorberar långsammare, kommer vätskan att ha mer tid på sig att

sprida sig i det absorberande skiktet. De superabsorberande partiklarna kommer alltså inte i lika högt utsträckning att försvåra vätsketransporten till övriga delar av den absorberande strukturen. Eftersom superabsorbenten dessutom har en lägre absorptionskapacitet, kommer denna spridande funktion att kvarstå även efter en längre tid. De superabsorberande partiklarna kommer ej heller att svälla så mycket och risken för att det bildas klumpar av svälld superabsorbent minskar. En högre koncentration av superabsorbent tillåts och flera superabsorberande partiklar, som är mindre till storleken i svällt tillstånd kan inrymmas i samma volym som färre konventionella superabsorberande partiklar, som är större i svällt tillstånd. Detta bidrar också till mindre klumpbildning. En högre koncentration av delvis neutraliserad superabsorbent kan alltså användas i den absorberande strukturen, vilket leder till en absorberande struktur med hög total absorptionskapacitet och stor spridningsförmåga med bibehållen komfort efter vätning.

Här följer nu exempel som visar att det delvis neutraliserade superabsorberande materialet enligt uppfinningen absorberar långsammare och absorberar mindre mängd vätska än konventionellt superabsorberande material.

BESKRIVNING AV EXEMPEL 1

Följande exempel är avsedda att illustrera att de delvis neutraliserade superabsorbenterna som används i strukturen enligt uppfinningen absorberar mindre mängd vätska och långsammare än konventionella superabsorbenter. Försöken gjordes genom doppabsorption, vilka är avsedda för bestämning av absorptionskapacitet för superabsorbenter.

Apparatur som användes

- Polyesternät, maskstorlek 59 µm
- Svets

- Testvätska, se nedan
- Våg, noggrannhet 0,0001 g

Testvätska

Syntetisk urin enligt följande recept:

	Koncentration
Magnesiumsulfat ($MgSO_4$)	0,66 g/l
Kaliumklorid (KCl)	4,47 g/l
Natriumklorid (NaCl)	7,60 g
Urea (Karbamid) (NH_2CONH_2)	18,00 g/l
Kaliumdivätefosfat (KH_2PO_4)	3,54 g/l
Natriumvätefosfat (Na_2HPO_4)	0,745 g/l
Triton X-100 0,1%-ig	1,00 g/l
Avjoniserat vatten till	
Nykockin (färg) 10 %-ig	0,4 g/l

Metod:

- Nät klipptes till 7x12 cm och svetsades i kanterna till påsar.
- Påsarna märktes.
- Påsarna (P) vägdes, noggrannhet 0,0001 g.
- 0,19-0,21 g superabsorbent (S) vägdes in, noggrannhet 0,0001 g.
  Superabsorbenterna rördes om.
- Påsarna svetsades ihop. Påsarna kontrollvägdes.
- Superabsorbenterna fördelades jämnt i påsen och lades sedan försiktigt i blöt i testvätskan.
- Påsarna lades ned en i taget, så att absorptionstiden blir exakt 15 sekunder.
  Samma noggrannhet gäller för den totala absorptionstiden upp till 5 min, men ej för 30 och 60 min.

- Påsarna togs upp efter 15 s och de hängde och droppade av i 2 minuter. Påsarna hängdes i ett hörn så att påsens botten utan svets var nedåt.
  Se Fig. 1, där påsen 1 hänger i en ring 2 med tre svetsade kanter 3 och en osvetsad kant 4 är nedåt.
- Eventuella droppar torkades försiktigt av.
- Påsarna vägdes och $A_{(15s)}$ erhölls, dvs påsens vikt efter 15 sekunder, noggrannhet 0,0001 g.
- Påsarna lades i blöt, togs upp, droppade av efter totala absorptionstiderna 30 sek, 45 sek, 1, 2, 5, 30 och 60 minuter, vilket gav $A_{(30s)}$, $A_{(45s)}$, $A_{(1\ m)}$, $A_{(2\ m)}$ $A_{(5\ m)}$, $A_{(30\ m)}$, $A_{(60\ m)}$.
- Testvätskan byttes efter varje fullständig provning.

Beräkning och angivande av resultat

$A_{(i)}$	=	Vikt prov efter absorption, g
i	=	15 s, 30 s, 45 s, 1 m, 2 m, 5 m, 30 m, 60 m
P	=	Vikt tom påse, g
S	=	Vikt superabsorbent, g
$D_{(i)}$	=	Provets absorption, g/g
K	=	Korrektion för påsens absorption
K	=	1,6 för i = 15 s, 30 s, 45 s, 1, 2, 5, 30 och 60 min

$$D(i) = \frac{A(i) - S - (P \times K)}{S}$$

Resultaten samlas i tabell 1, där IM 7110 är den delvis neutraliserade superabsorbenten och IM 7100 är den konventionella superabsorbenten. Av resultaten framgår att absorptionen är lägre vid alla tider för den delvis neutraliserade superabsorbenten IM 7110, jämfört med den konventionella superabsorbenten. Resultaten visas även i Fig. 2 där absorptionen D, är avsatt mot tiden. Kurvan för den delvis

neutraliserade superabsorbenten ligger hela tiden under den för den konventionella superabsorbenten.

Tabell 1

	Absorption (g/g)	
TID	IM 7110	IM 7100
15 sek	2,4	8,0
30 sek	18,3	22,9
45 sek	25,9	32,9
1 min	28,4	36,9
2 min	29,6	39,3
5 min	30,9	40,3
30 min	32,0	40,5
60 min	32,8	40,1

All användning av produkter, som appliceras mot hud kan leda till oönskade sidoeffekter. Dessa kan uppstå på grund av ocklusion, fukt, mekaniska, mikrobiella och enzymatiska faktorer och de kan förorsaka sidoeffekter såsom hudirritationer, primära eller sekundära hudinfektioner och oönskad lukt. En pH-höjning är en normal händelse vid användning av absorptionsprodukter mot hud. Flera icke önskade sidoeffekter kan emellertid uppstå till följd av eller i samband med en pH-höjning. Exempel på sådana icke önskade sidoeffekter är irritativ kontaktdermatit, som uppvisar ett samband med hudens yt-pH.

Ett annat exempel på oönskade sidoeffekter är, att vissa bakterier såsom Proteus kan metabolisera ämnen i urin och andra kroppsvätskor och ge upphov till illaluktande ämnen såsom ammoniak och aminer, vilket även orsakar en höjning av pH. Vid högt pH förskjuts jämvikten för många luktande ämnen på sådant sätt, att fler flyktiga komponenter bildas, och därför luktar de mer än vid lågt pH.

Även mikroorganismers tillväxt gynnas av en miljö såsom i ett absorberande alster där det finns tillgång till bland annat fukt, näring och värme. Höga bakterietal utgör

en risk för uppkomst av infektioner. Vidare innebär en hög bakteriell närvaro en ökad risk för uppkomst av obehagliga lukter orsakade av olika substanser som bildas vid biologisk eller kemisk nedbrytning av beståndsdelar i kroppsvätskor, såsom urin eller mensvätska. Mikroorganismer har en aktivitet som är starkt pH-beroende och minskar med sjunkande pH.

Då ett delvis neutraliserat superabsorberande material används i den absorberande strukturen enligt uppfinningen sänks pH. De ovan nämnda oönskade sidoeffekterna minskar alltså i en absorberande struktur enligt uppfinningen.

Delvis neutraliserat superabsorberande material används i absorberande alster beskrivna i den svenska patentansökan SE 9702298-2. Ett sänkt pH-värde erhålles genom att den absorberande strukturen i alstret innefattar en pH-reglerande substans i form av ett delvis neutraliserat suberabsorberande material. Det har visat sig att om pH i det absorberande alstret, efter vätning, är i intervallet 3,5 - 4,9, erhålls en märkbart tillväxthämmande effekt på oönskade stammar av mikroorganismer och uppkomsten av oönskade sidoeffekter, som kan uppstå på grund av användning av alstret, minskar.

Exempel på samband mellan neutralisationsgrad och pH i det superabsorberande materialet framgår nedan. Dessa uppgifter har hämtats ur ansökan SE 9702298-2.

Neutralisationsgrad %	pH
18	4,0
25	4,3
30	4,5
35	4,7
45	5,0
60	5,5

Neutralisationsgraden hos det superabsorberande materialet enligt uppfinningen är mellan 20 och 50 %.

Ytterligare en fördel med uppfinningen är alltså att man undviker uppkomsten av exempelvis dålig lukt och hudbesvär vid användning av ett absorberande alster mot hud. Den tillväxthämmande effekten grundar sig på att många mikroorganismer har en aktivitet, som är starkt pH-beroende och minskar med minskande pH, varför en sänkning av pH leder till en minskad aktivitet hos flertalet mikroorganismer. Enzymer såsom lipaser och proteaser har en aktivitet, som är starkt pH-beroende och minskar med minskande pH, varför en sänkning av pH även leder till en minskad enzymaktivitet och därmed en minskning av negativ hudpåverkan.

Följande exempel illustrerar effekten i absorberande alster med en absorptionskropp innefattande delvis neutraliserat superabsorberande material. Jämförelse göres med konventionella material av motsvarande typ.

En absorberande kropp innehållande absorptionsmaterial och absorberad vätska är till sin natur ett heterogent system ur pH-synpunkt. Systemet kan innehålla super-absorberande material, fibrer och vätska med flera jonslag. För att få reprocuderbara pH-värden måste mätningar göras på ett flertal ställen i provkroppen och medel-värdet beräknas.

BESKRIVNING AV EXEMPEL 2, 3, 4 och 5:

Testvätska:

Steril syntetisk urin till vilken har satts tillväxtmedium för mikroorganismer. Den syntetiska urinen innehåller mono- och divalenta kat- och anjoner samt urea och har beretts enligt uppgifter i Geigy, Scientific Tables, vol 2, 8:th ed. 1981 s53.

Tillväxtmediet för mikroorganismer bygger på uppgifter om Hook- och FSA-media för enterobakterier. pH i denna blandning är 6,6.

TESTMETODER:

Metod 1, tillverkning av absorptionskroppar för test

Absorptionskroppar tillverkades med hjälp av en något modifierad provkropps-formare enligt SCAN C 33:80. Fluffmassa och superabsorberande material av önskad typ vägdes upp, och en jämn blandning av fluffmassa och superabsorberande material fördes därefter in i en luftström med ett undertryck av ca 85 mbar och genom ett rör med en diameter av 5 cm och försett med ett metallnät i botten på vilket en tunn tissue placerats. Blandningen av fluffmassa och superabsorberande material samlades därvid på tissuen på metallnätet och utgjorde därefter absorptionskroppen. Absorptionskroppen vägdes därefter och komprimerades till en bulk av 6-12 cm^3/g. Ett antal absorbtionskroppar benämnda Prov 1 och Prov 2 med olika sammansättning enligt nedan tillverkades. Prov 1 innehåller superabsorbenter IM 7100, dvs konventionella superabsorbenter, och prov 2 innehåller delvis neutraliserade superabsorbenter IM 7110.

Absorptionskropparna innehåller kemisk cellulosamassa med namnet Korsnäs EA.
Absorptionskroppens totalvikt är 0,98 g.
Vikt superabsorberande material: 0,39 gram.
Vikt kemisk cellulosamassa: 0,59 gram.

Metod 2, mätning av pH i absorptionskropp.

En absorptionskropp med diameter ca 50 mm tillverkades enligt metod 1. 14 ml testvätska tillsattes en absorptionskropp, prov 1, och 11 ml testvätska till en absorptionskropp prov 2, varefter absorptionskroppen fick svälla i 30 min. (Olika volymer vätska tillsattes då superabsorbenterna absorberar olika mycket vätska.)

Därefter mättes i pH i absorptionskroppen med hjälp av en ytelektrod, Flatbottnad Metrohm pH-meter, Beckman ∅12 eller ∅72. Parallella mätningar utfördes på minst två olika absorptionskroppar. pH mättes på 10 punkter på varje absorptionskropp och medelvärdet beräknades.

Metod 3, mätning av bakteriehämning i absorptionskroppar.

Bakteriesuspensioner av Escherichia coli (E.c.), Proteus miràbilis (P.m.), Enterococcus faecalis (E.f.) uppodlades i näringsbuljong (Nutrient Broth Oxoid CMI) över natten vid en temperatur av 30 °C. Ympkulturerna späddes, och bakteriehalterna beräknades. Kulturerna blandades i olika proportioner, så att den slutliga blandkulturen höll ca 10^4 organismer per ml syntetisk urin. 10 ml av den syntetiska urinen sattes till en steril sputumburk 70,5 x 52 mm, volym 100 ml, och absorptionskroppen placerades upp och ned i burken och fick suga vätska under 5 min, varefter burken vändes och inkuberades i 35 °C i respektive 0, 6 och 12 timmar, varefter bakterievärdet i absorptionskroppen bestämdes. Som näringsmedium användes TGE agar för mätning av totalantal bakterier och Drigalski agar för specifik mätning av Escherichia coli och Proteus miràbilis samt Slanetz Bartley-agar för specifik mätning av Enterococcus faecalis. Resultatet redovisas i följande tabeller.

TESTRESULTAT:

Exempel 2

Ur Tabell 2 framgår, att det föreligger god hämning av tillväxt av Esherichia coli i prov 2 som består av en absorptionskropp innehållande delvis neutraliserade superabsorbenter, IM 7110.

Tabell 2

Esherichia coli	**0 timmar**	**6 timmar**	**12 timmar**
Prov 1	3,5	7,3	8,9
Prov 2	3,5	3,7	3,3

Exempel 3

Ur Tabell 3 framgår, att det föreligger god hämning av tillväxt av Proteus mirábilis i prov 2 som består av en absorptionskropp innehållande delvis neutraliserade superabsorbenter, IM 7110.

Tabell 3

Proteus mirábilis	**0 timmar**	**6 timmar**	**12 timmar**
Prov 1	3,2	6,3	9
Prov 2	3,2	<2	<2

Exempel 4

Ur Tabell 4 framgår, att det föreligger god hämning av tillväxt av Enterococcus faecalis i prov 2 som består av en absorptionskropp innehållande delvis neutraliserade superabsorbenter, IM 7110.

Tabell 4

Enterococcus faecalis	**0 timmar**	**6 timmar**	**12 timmar**
Prov 1	3,4	6,3	7,6
Prov 2	3,4	3,3	3,4

Mätningarna i Exempel 2-4 genomfördes enligt metod 3.

Ur exempel 2-4 framgår alltså att det föreligger god hämning av tillväxt av mikroorganismer vid användande av en delvis neutraliserad superabsorbent i en absorptionskropp.

Exempel 5

Ur Tabell 5 framgår att pH i en absorptionskropp av Prov 1, med konventionell superabsorbent, har ett högre pH, över 6 och upp till 8,7 efter 12 timmar. I prov 2, med delvis neutraliserad superabsorbent erhålles ett lägre pH som är 4,6 och har alltså ett värde som är lämpligt för hämning av tillväxt av mikroorganismer.

Tabell 5

PH	**0 timmar**	**6 timmar**	**12 timmar**
Prov 1	6,1	6,2	8,7
Prov 2	4,6	4,6	4,6

Mätningarna genomfördes enligt Metod 2.

Uppfinningen avser således en absorberande struktur i absorberande alster såsom blöja, blöjbyxa, inkontinensskydd, dambinda, trosskydd eller liknande, vilken struktur innefattar minst 40 viktprocent superabsorberande material, baserat på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det superabsorberande materialet är fördelat, varvid det superabsorberande materialet uppvisar en neutralisationsgrad, vilken är mellan 20 och 50 %. En föredragen neutralisationsgrad är mellan 25 och 35 %. Vid neutralisationsgrader mellan 20 och 50 % eller 25 och 35 % erhålles pH som är fördelaktiga för att motverka t ex tillväxten av mikroorganismer och oönskade sidoeffekter minskar på detta sätt. Detta möjliggör även användning av alstret under längre tid, både på grund av pH-sänkningen och den högre absorptionskapaciteten. Detta är en stor fördel med den absorberande strukturen jämte fördelen med den långsammare och lägre totala absorptionen hos de enskilda superabsorberande partiklarna, vilket minskar risk för gelblockering och klumpbildning.

Halten av superabsorberande material, kan ligga mellan 40 och 50 viktprocent, baserat på den absorberande strukturens totala vikt i torrt tillstånd. Andelen superabsorbent kan dock vara högre, t ex upp till 90 viktprocent. Den absorberande strukturen kan även enbart bestå av superabsorbent.

Den angivna andelen superabsorberande material är i första hand baserad på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det superabsorberande materialet är fördelat.

Huvudsakligen användes delvis neutraliserat superabsorberande material i den absorberande strukturen enligt uppfinningen. Men det är även möjligt att ha med konventionellt superabsorberande material. Då kan exempelvis den delvis neutraliserade superabsorbenten vara placerad i vätområdet, medan den konventionella superabsorbenten är placerad utanför vätområdet. Fördelen med att ha det superabsorberande materialet med den lägsta neutralisationsgraden lokaliserad till alstrets vätområde, dvs till alstrets grenområde, samt konventionellt superabsorberande material lokaliserad till alstrets ändpartier, är att vätskan i en sådan struktur uppvisar en ökad möjlighet att spridas från vätområdet till alstrets ändpartier. På det viset är det möjligt att öka utnyttjandegraden av den absorberande strukturens totala absorptionskapacitet, samt vidare minskar risken för gelblockering i vätområdet.

Andra exempel på fördelning av superabsorbent är att den delvis neutraliserade superabsorbenten placeras i en första zon närmare användaren medan den konventionella superabsorbenten lokaliseras till en andra zon, varvid den andra zonen är belägen under den första zonen sett i riktning från användaren av det absorberande alstret. Härvid erhålles samma fördelar som är nämnda ovan, genom att vätskan sprids från zonen med den lägsta neutralisationsgraden där vätska först kommer att tas emot, till zonen med konventionellt superbsorberande material.

Utnyttjandegraden kan ökas och risken för gelblockering i skiktet närmare användaren minskar.

Ytterligare exempel är att den delvis neutraliserade superabsorbenten appliceras i ett skikt i botten av strukturen, vilket härvid kan fungera som ett vätskespridningsskikt.

Koncentrationen av det delvis neutraliserade superabsorberande materialet i de exempel som nämns ovan skall då vara minst 40 viktprocent i de områden där det delvis neutraliserade superabsorberande materialet är placerat.

Den föredragna utföringsformen innehåller dock endast det delvis neutraliserade superabsorberande materialet, för att få det sänkta pH som eftersträvas för att minska de oönskade sidoeffekterna.

Eftersom delvis neutraliserad superabsorbent går att använda i en hög koncentration kan den med fördel användas i en tunn absorberande struktur. En tunn absorberande struktur kan erhållas med torrformad, komprimerad kemitermomekanisk massa CTMP, kemisk massa CP eller liknande. En tunn produkt är intressant ur den synpunkten att den är diskret och komfortabel.

I en föredragen utföringsform av uppfinningen innehåller den absorberande strukturen förutom delvis neutraliserad superabsorbent torrformad, komprimerad CTMP-massa, CP-massa eller liknande. Denna absorberande struktur mattbildas på konventionellt sätt och därefter högkomprimeras den. Därmed erhålles en mycket tunn absorberande struktur. I det här fallet är delvis neutraliserad superabsorbent inblandad i kärnan. Superabsorbenten kan exempelvis blandas homogent med cellulosafibrerna i ett s k mixat skikt, eller placeras mellan två cellulosabaserade skikt. Liksom i strukturen beskriven ovan kommer även här andelen delvis neutraliserad superabsorbent att vara minst 40 viktprocent baserat på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det

superabsorberande materialet är fördelat. Neutralisationsgraden är mellan 20 och 50 % och företrädesvis mellan 25 och 35 %.

Genom att använda torrformad, komprimerad CTMP-massa, CP-massa eller liknande i den absorberande strukturen erhålles en tunn produkt, vilken är diskret att bära. Samtidigt undviks de oönskade sidoeffekterna såsom dålig lukt och hudirritationer, vilket beskrivits ovan. Även de nackdelar som nämnts ovan såsom gelblockering och klumpbildning undvikes och en hög absorptionskapacitet erhålles.

Karakteristiska egenskaper för den komprimerade strukturen enligt uppfinningen är att kärnan är tunn innan vätning och sväller och sprider vätska momentant vid vätning. Genom att använda torrformad, komprimerad pappersmassa i den absorberande strukturen kan en så tunn struktur som 1 till 3 mm erhållas. Även så tunna kärnor som 0,5 mm kan erhållas och kan då användas i t ex trosskydd. För barnblöjor behövs en högre absorberande förmåga, och här kan tjocklekar som upp till 8 mm vara lämpliga. Föredragna tjocklekar är 1 till 8 mm respektive 1 till 3 mm.

Komforten bibehålles trots den höga koncentrationen av superabsorbent och detta sker genom att den delvis neutraliserade superabsorbenten absorberar långsammare och har lägre absorptionsförmåga.

Uppfinningen avser även absorberande alster, såsom blöja, blöjbyxa, inkontinensskydd, dambinda, trosskydd eller liknande, innefattande ett övre vätskegenomträngligt skikt, ett undre vätskeogenomträngligt spärrskikt samt en däremellan innesluten absorberande struktur, varvid den absorberande strukturen är av det slag som beskrivs ovan.

I absorberande alster innefattas vanligen även ett insläpps/transportskikt mellan det övre vätskegenomsläppliga ytskiktet och den absorberande strukturen. Ett insläpps/transportskikt har en öppen och luftig struktur och har till uppgift att snabbt ta emot en given mängd vätska och skall snabbt leda vätskan vidare till den

absorberande strukturen. Insläpps/transportskiktet kan t ex vara ett nonwoven-material, som kan framställas genom thru-air bindning och kardning eller nålning av syntetiska fibrer, såsom polyester, polypropen eller blandningar därav. Sådana insläpps/transportskikt som ovan beskrivits och som huvudsakligen består av syntetiska, relativt hydrofoba fibrer, inkluderas inte i vad som i den här ansökan avser den absorberande strukturen. Däremot kan ett absorberande alster enligt uppfinningen innefatta ett sådant insläpps/transportskikt.

En föredragen utföringsform av alstret är att det är en inkontinensprodukt eller femininprodukt.

Med uttrycket "innefattande" menar vi inkluderande, men ej begränsande till.

Patentkrav

1. Absorberande struktur i absorberande alster såsom blöja, blöjbyxa, inkontinensskydd, dambinda, trosskydd eller liknande, **kännetecknad** av att den innefattar minst 40 viktprocent superabsorberande material, baserat på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det superabsorberande materialet är fördelat, varvid det superabsorberande materialet uppvisar en neutralisationsgrad mellan 20 och 50 %.

2. Absorberande struktur enligt krav 1, **kännetecknad** av att neutralisationsgraden är mellan 25 och 35 %.

3. Absorberande struktur enligt något av föregående krav, **kännetecknad** av att den absorberande strukturen utöver superabsorberande material består av torrformad, komprimerad CTMP-massa, CP-massa eller liknande.

4. Absorberande struktur enligt krav 3, **kännetecknad** av att den i torrt tillstånd har en tjocklek på 1 mm till 8 mm.

5. Absorberande struktur enligt krav 3, **kännetecknad** av att den i torrt tillstånd har en tjocklek på 1 mm till 3 mm.

6. Absorberande struktur enligt något av föregående krav, **kännetecknad** av att det absorberande alstret är avsett som inkontinensprodukter eller femininprodukter.

7. Absorberande alster, såsom blöja, blöjbyxa, inkontinensskydd, dambinda, trosskydd eller liknande, innefattande ett övre vätskegenomträngligt skikt, ett undre vätskeogenomträngligt spärrskikt samt en däremellan innesluten absorberande struktur, **kännetecknat** av att den absorberande strukturen är av det slag som anges i något eller några av kraven 1 till 6.

Sammandrag

Absorberande struktur i absorberande alster såsom blöja, inkontinensskydd, dambinda, trosskydd eller liknande, varvid den innefattar minst 40 viktprocent superabsorberande material, baserat på den absorberande strukturens totala vikt i torrt tillstånd i det eller de områden där det superabsorberande materialet är fördelat, varvid det superabsorberande materialet är endast delvis neutraliserat.

Absorberande alster innefattande den absorberande strukturen.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
52430-58018		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE99/02371	15/12/1999	16/12/1998
International Patent Classification (IPC) or national classification and IPC A61L15/60		
Applicant SCA HYGIENE PRODUCTS AB et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☒ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13/07/2000	09.04.01

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE99/02371

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-9,12-15,17, 20-26	as originally filed	
10,11,16,18,19	with telefax of	18/12/2000

Claims, No.:

1-9	with telefax of	18/12/2000

Drawings, sheets:

1/1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
   see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-9
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-9
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations
   see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

   see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

SECTION I

1. The applicant did not provide a document showing that IM 7100 and IM 7110 are equivalent to Hysorb C7100 and Hysorb C7110. The amendment of IM 7100 and IM 7110 into Hysorb C7100 and Hysorb C7110 in the description on pages 10, 11, 16, 18 and 19, filed with telefax dated 18/12/00, may therefore introduce subject-matter which extends beyond the content of the application as filed and is contrary to Article 34(2)(b) PCT. This report has therefore been established as if this amendment has not been made.

SECTION V

2. a) The following documents, which were cited in the International Search Report, are referred to in this report; the numbering will be adhered to in the rest of the procedure:

   D1: EP 0202126

   D2: EP 0391108

   The following document is cited by the IPEA. The numbering will be adhered to in the rest of the procedure:

   D3: WO 98 57677

   D3 is a family member of SE 9 702 298, which has been cited in the present application (cf. page 13, lines 1-12).

   b) D1 refers to absorbent articles with an absorbent core containing hydrophilic fibre material and a water insoluble hydrogel material in a weight ratio of from 30:70 to 98:2 (cf. claims 1, 8 and page 8, lines 9-14). The hydrogel material falls within the definition of superabsorbent materials (cf. definition in present description page 3, lines 27- 30). In example 9, the core of patch n°3 contains 20% hydrogel, which has a degree of neutralisation of 34%. Nevertheless, D1 does not disclose explicitly an absorbent structure comprising at least 40% of a surperabsorbent material having a degree of neutralisation between 20 and 50%. D1 does not specify the thickness of the absorbent core.

   c) D2 refers to hydrophilic, swellable graft polymers, which are suitable partially neutralised superabsorbents that can be used in accordance with the present invention (cf. claim 1 and present description page 6, line 34 to page 7, line 2). The

neutralisation degree of the polymers of D2 are from 25-80% (cf. Table II, page 9). D2 is neither concerned with the proportions of these polymers in an absorbent structure nor the thickness of such a structure.

d) D3 is a patent application from the present applicant which was published between the priority and the filing date of the present application (cf. section VI 5.). Initially, the same absorbent structure was claimed in claim 1 of the present application, as in D3. With telefax of 18/12/2000, the applicant restricted the subject-matter of claim 1 to absorbent structures having a thickness of 1-8 mm when dry. Since D3 does not specify the thickness of the absorbent structure, D3 is not relevant any more (cf. Rule 64.3 PCT and section VI).

3. Novelty

a) The subject-matter of claim 1 is an absorbent structure having a thickness of 1-8 mm when dry, comprising at least 40% by weight superabsorbent material based on total weight of the structure in a dry state in the region(s) where said material is distributed. The superabsorbent material has a degree of neutralisation between 20 and 50%.
None of the aforementioned documents discloses nor anticipates an absorbent structure having a thickness as defined in claim 1.
The subject-matter of claim 1 therefore is new over the cited prior art (Art. 33(2) PCT)

b) Item a) also applies to dependent claims 2-8 (Art. 33(2) PCT).

c) The subject-matter of claim 9 is an absorbent article comprising an upper liquid-permeable sheet, a bottom liquid-impermeable barrier sheet and an absorbent structure as defined in one or more of claims 1-8.
Since the absorbent structure is new over the cited prior art (cf. item 3.a)), the subject-matter of claim 9 is also new over the prior art (Art. 33(2) PCT).

4. Inventive step

a) D1, which is considered to represent the closest prior art, refers, as already mentioned under item V 2.b), to absorbent articles with an absorbent core containing hydrophilic fibre material such as cellulose fibres and a water insoluble hydrogel material in a weight ratio of from 30:70 to 98:2. The hydrogel material falls within the

definition of superabsorbent materials. In example 9, the core of patch n°3 contains 20% hydrogel, which has a degree of neutralisation of 34%.
As mentioned in the present application, partially neutralized superabsorbent materials with a degree of neutralization of 20-50% have a lower absorption capacity than conventional superabsorbent materials, which have a degree of neutralization of about 70%. Therefore, they do not swell as much and the risk of gel blocking is reduced (cf. page 3, lines 5-29, page 5, lines 25-34 and claim 1). This propriety is inherent to the absorbent core of patch n°3 described in example 9 of D1, which has a degree of neutralisation of 34%.

Consequently, the subject-matter of claim 1 differs from the aforementioned example 9 only in that the absorbent structure contains at least 40% of the superabsorbent material and that the structure has a thickness of 1-8 mm.

It is already known from D1 that the weight ratio of hydrophilic fibre to hydrogel is from 30:70 to 98:2, preferably from 50:50 to 95:5 (cf. claims 8, 9).

When trying to conceive an absorbent structure, the man skilled in the art would therefore take into consideration a ratio of fibre to hydrogel such as 50:50. Especially when starting from example 9, he would expect an improved absorbency capacity when increasing the amount of superabsorbent in example 9 to such a ratio.

Moreover, the determination of the thickness of such a structure in accordance with the utilized material is a matter of routine for the skilled person. It is an obvious matter that absorbent articles, such as for example panty liners, should be as thin as possible. Currently marketed absorbent articles, especially panty liners, already have a thickness falling within the definition of claim 1.

Hence, the IPEA considers that the subject-matter of claim 1 is easily derivable from D1 for the skilled person and does not involve an inventive step (Art. 33(3) PCT).

b) Dependent claims 2-8 do not contain any features which, in combination with the features of claim 1 to which they refer, meet the requirements of the PCT in respect of inventive step, since their subject-matter is easily derivable from D1 or represents a matter of routine for the skilled person.

c) According to item 4.a), an absorbent structure as defined in claim 1 is easily derivable from the prior art.
Furthermore, the absorbent articles described in D1 comprise an absorbent core positioned between a liquid impervious backing sheet and a liquid pervious top sheet (cf. page 3, lines 20-29). For the man skilled in the art, it would therefore be a matter of routine, when conceiving an absorbent article, to combine a structure as defined in claim 1 with an upper-liquid permeable sheet and a bottom liquid-impermeable sheet.

Thus, the subject-matter of claim 9 is derivable from the prior art and does not involve an inventive step (Art. 33(3) PCT).

SECTION VI

5. Certain published documents (Rule 70.10)

Application No Patent No	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date *(valid claim)* *(day/month/year)*
WO 98/57677 (D3)	23.12.98	10.06.98	17.06.97

D3 discloses absorbent articles with an absorbent body. D3 does not disclose nor anticipate the thickness of said absorbent body. (Cf. section V 2.d)).

SECTION VIII

6. The abbreviations IM 7100 and IM 7110 used in the description as originally filed are unclear (Art. 6 PCT). (Cf. Section I 1.)

7. It seems that the wording of claim 1, line 12 should be "...between 20 and 50% and in that the absorbent structure has a thickness of ..." (Art. 6 PCT).

8. Dependent claim 7 refers to an "absorbent article", which is not consistent with independent claim 1, which refers to an "absorbent structure" (Art. 6 PCT).

9. The term "conventional" used in claims 6 and 7 is vague and unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear (Art. 6 PCT).

- The bags were weighed which gave $A_{(15s)}$, in other words the weight of the bag after 15 seconds measured to an accuracy of 0.0001 g.

- The bags were placed in soak, taken up and allowed to drip after total absorption times of 30 sec., 45 sec., 1, 2, 5, 30 and 60 minutes, which gave $A_{(30s)}$, $A_{(45s)}$, $A_{(1\ m)}$, $A_{(2\ m)}$, $A_{(5\ m)}$, $A_{(30\ m)}$, $A_{(60\ m)}$.

- The test liquid was changed after each completed test.

Calculations and results obtained

$A_{(i)}$ = Sample weight after absorption, g

i = 15 s, 30 s, 45 s, 1 m, 2 m, 5 m, 30 m, 60 m

P = Empty bag weight, g

S = Weight of superabsorbent, g

$D_{(i)}$ = Sample absorption, g/g

K = Bag absorption correction

K = 1.6 for i = 15 s, 30 s, 45 s, 1, 2, 5, 30 and 60 min.

$$D(i) = \frac{A(i)-S-(P\times K)}{S}$$

The results are gathered in Table 1, where IM 7110 is the partially neutralised superabsorbent and IM 7100 is the

conventional superabsorbent. It will be evident from the results that in the case of the partially neutralised superabsorbent IM 7110 absorption is at all times lower than the absorption of the conventional superabsorbent. The results are also shown in Fig. 2, where the absorption D is plotted against time. The curve representing the partially neutralised superabsorbent constantly lies beneath the curve representing the conventional superabsorbent.

Table 1

	Absorption (g/g)	
TIME	IM 7110	IM 7100
15 sec.	2.4	8.0
30 sec.	18.3	22.9
45 sec.	25.9	32.9
1 min.	28.4	36.9
2 min.	29.6	39.3
5 min.	30.9	40.3
30 min.	32.0	40.5
60 min.	32.8	40.1

All products that are worn in direct contact with the skin can lead to undesired side effects. These side effects can be the result of occlusion, the presence of moisture and factors of a mechanical, microbial and enzymatic nature, and can result in skin irritation, primary or secondary skin

Method 1, manufacture of absorbent test bodies

Absorbent bodies were produced with the aid of a slightly modified sample body former according to SCAN C 33:80. Fluff pulp and superabsorbent material of desired kind were weighed out, whereafter a uniform mixture of fluff pulp and superabsorbent material was passed in an air stream at a subpressure of about 85 mbar through a pipe having a diameter of 5 cm and provided with a bottom-carried metal net and thin tissue placed on said net. The mixture of fluff pulp and superabsorbent material was collected on the tissue disposed on the metal net and formed the absorbent body. The absorbent body was then weighed and compressed to a bulk density of 6-12 cm^3/g. A number of absorbent bodies designated Sample 1 and Sample 2 of mutually different compositions were then produced as described below. Sample 1 contained superabsorbents IM 7100, i.e. conventional superabsorbents, and Sample 2 contained partially neutralised superabsorbents IM 7110.

The absorbent bodies contained chemical cellulose pulp named Korsnäs EA.

The absorbent bodies had a total individual weight of 0.98 g.

The superabsorbent material weight 0.39 gram.

The chemical cellulose pulp weighed 0.59 gram.

Method 2, measuring the pH of the absorbent body

An absorbent body having a diameter of about 50 mm was manufactured in accordance with Method 1. 14 ml of test liquid were added to an absorbent body, sample 1, and 11 ml

TEST RESULTS

Example 2

It will be evident from Table 2 that the absorbent body according to Sample 2 comprising partially neutralised superabsorbents IM 7110 effectively inhibited the growth of Esherichia coli.

Table 2

Esherichia coli	**0 hours**	**6 hours**	**12 hours**
Sample 1	3.5	7.3	8.9
Sample 2	3.5	3.7	3.3

Example 3

It will be evident from Table 3 that the growth of Proteus mirabilis was effectively prohibited in Sample 2, which consisted of an absorbent body that included partially neutralised superabsorbents IM 7110.

Table 3

Proteus mirabilis	**0 hours**	**6 hours**	**12 hours**
Sample 1	3.2	6.3	9
Sample 2	3.2	<2	<2

Example 4

It will be evident from Table 4 that the growth of Enterococcus faecalis was effectively inhibited in Sample 2, which consisted of an absorbent body that included partially neutralised superabsorbents IM 7110.

CLAIMS

1. An absorbent structure in absorbent articles such as diapers, pants diapers, incontinence protectors, sanitary napkins, panty liners and like articles, **characterised** in that the structure comprises at least 40 percent by weight superabsorbent material based on the total weight of the absorbent structure in a dry state in the region or in these regions in which the superabsorbent material is distributed, wherein said superabsorbent material has a degree of neutralisation between 20 and 50%.

2. An absorbent structure according to Claim 1, **characterised** in that the degree of neutralisation is between 25 and 35%.

3. An absorbent structure according to any one of the preceding Claims, **characterised** in that the absorbent structure includes dry-formed, compressed CTMP pulp, CP pulp or like pulp, in addition to superabsorbent material.

4. An absorbent structure according to Claim 3, **characterised** in that the absorbent structure has a thickness of 1 mm to 8 mm when dry.

5. An absorbent structure according to Claim 3, **characterised** in that said structure has a thickness of 1 mm to 3 mm when dry.

6. An absorbent structure according to any one of the preceding Claims, **characterised** in that said absorbent article is intended for incontinence protectors or feminine products.

7. An absorbent article such as a diaper, pant diaper, incontinence protector, sanitary napkin, panty liner and the like, comprising an upper liquid-permeable sheet, a bottom liquid-impermeable barrier sheet, and an absorbent structure enclosed therebetween, **characterised** in that the absorbent structure is of the kind defined in one or more of Claims 1 to 6.

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